REMARKS

Reconsideration and allowance of the application are respectfully requested. Examiner's indication that Claims 2-7 and 33 are allowable is acknowledged.

Claims 36, 38 and 45 have been amended. Claim 36 has been amended to clarify the language. Claims 38 and 45 have been amended to correct typographical errors. In addition, Claims 47-54 have been newly added and are fully supported by the original specification. No new matter is added. Claims 1-54 are now pending and are patentable.

1. Drawings and Textual Description

The drawings stand objected under 37 CFR 1.83(a) for not showing each feature specified in the claims. To overcome this objection, new FIGS. 10 and 11 have been proposed as shown in the attached sheet and are entirely based on the textual description on page 21 of the original specification. Hence, addition of proposed FIGS. 10 and 11 simply conform the drawings which are part of the specification to the text of anther part of the specification. Accordingly, the text on page 21 of the specification has been amended to add appropriate references to proposed FIGS. 10 and 11. Therefore, no new matter is added.

In the proposed FIGS. 10 and 11, an RF or microwave antenna 1010 is shown coupled to the electrical coupler 130; wired or

wireless communication system 1110 and fiber or free-space optical communication system 1120 are coupled to the device in FIG. 1. The system shown in the proposed FIG. 10 can be used to represent a base station or the receiver portion of a moving transceiver or wireless transceiver in wireless communication systems or the receiver portion of a satellite communication transceiver mounted on a satellite or on a ground station. Therefore, the proposed FIGS. 10 and 11 show all features in the pending claims. The objection to the drawings, therefore, should be withdrawn after the Examiner approves proposed FIGS. 10 and 11.

2. Claim Rejections under 35 USC 112

Claims 36, 38, 39-41 and 43-46 stand rejected under 35 USC 112, first paragraph because the specification does not provide an enabling disclosure. This contention, however, is respectfully traversed.

The claimed communication devices and systems are described in the text on page 21 of the original specification and are well known not only in the communication field and industry but also in the general public. Examples include desktop wired telephones, cordless home phones as wireless transceivers connected to conventional wired public phone networks, cellular phones as moving wireless transceivers used in commercial wireless service providers for business and consumer markets,

cell phone transceiver towers in the residential area, satellite dishes in satellite communication networks, and many others. These and other communication devices and systems are so well known that a person skilled in the art, based on the teaching of the description of the original specification in this application, can readily know how to use and make the claimed devices and systems without undue experimentation. See, in general, MPEP §2164.

Therefore, Applicants respectfully suggest that the original specification meets the enablement requirement and thus Claims 36, 38, 39-41 and 43-46 are patentable under 35 USC 112, first paragraph.

Claims 36, 38, 39-41 and 43-46 also stand rejected under 35 USC 112, second paragraph as being indefinite. This contention, however, is respectfully traversed.

Claim 36 has been amended to be more specific about the relation between the antenna and the electrical coupler. Hence, the rejection should be withdrawn.

Claim 38 recites "an electrical coupler coupled to receive said electromagnetic wave signal from said antenna" and thus distinctly defines the structural relation of the recited antenna with the recited electrical coupler. Claim 36 is therefore definite and the rejection to Claim 38 should be withdrawn.

Claim 39 recites a satellite on which said one transceiver is located and this distinctly defines the structural relationship in the system. The rejection to Claim 39 should be withdrawn.

Claim 40 simply specifies that the recited transceiver is a base station and is definite. The rejection to Claim 40 should be withdrawn.

Claim 41 simply specifies the recited transceiver to be a moving unit and is definite and clear in its meaning. Hence, the rejection to Claim 41 should be withdrawn.

With respect to Claims 43-46, the structural relationships between the optical communication system and the electronic communication system are distinctly defined in the base Claim 42. Claims 43-46 simply further specify the nature of the optical communication system or the electronic communication system. Hence, the rejections to Claims 43-46 should be withdrawn.

In view of the above, Claims 36, 38, 39-41 and 43-46 are patentable under 35 USC 112, second paragraph.

3. Claim Rejections under 35 USC 103(a)

Other than allowable Claims 2-7 and 33, all other pending claims stand rejected as being obvious over Ho alone or various combinations of Ho with Vahala, Boord, Hoe, Hahn, Maker and Yao.

These contentions, however, lack proper support by the teaching of the cited prior art and hence are respectfully traversed.

Claim 1, for example, recites an optical resonator formed of a dielectric material that has an energy level structure that absorbs light at a selected optical frequency and absorbs electrical energy at an electrical frequency. In addition, the absorption of said electrical energy changes absorption of said light.

The Office Action contends that the text in Column 10, lines 55-65 in Ho describes the above features in Claim 1. In order to show precisely what is disclosed by Ho in this regard, the part of the disclosure in Ho from Column 10, line 55 to Column 11, line 7 is quoted below.

> A resonance controller 110 outputs a variable voltage that creates a variable electric field applied to the microcavity resonator 12. Changes in the applied electric field induce changes in the refractive index of the microcavity resonator 12. Thus, by changing the electric field via the output voltage of the resonance controller 110, the microcavity resonator 12 may be tuned to various resonant wavelengths so that selective

> wavelengths of light propagating in the waveguide 14 are coupled to the microcavity resonator 12 depending on the resonant wavelength thereof as controlled by the controller 110 and for subsequent coupling to the waveguide 16 for output via the port 24. Such changes in the refractive index of the microcavity resonator 12 may be enhanced by having quantum wells in the semiconductor guiding layer. A further disposition of pn junctions within the guiding layer may also enhance the change in the refractive index via carriers introduced by injection current at the pn junction from the applied voltage.

The above description makes specific reference to the microcavity resonator 12 in FIGS. 1A and 1B (Column 10, lines 47-49). Referring to FIG. 1B, the microresonator 12 is made of a semiconductor GaAs guiding layer 30 and AlGaAs cladding layers 32 and 28 formed over a GaAs substrate 26.

The semiconductor GaAs is notoriously known for its electro-optical effect and the induced optical birefringence. The refractive index of GaAs changes under an applied electrical field. The text in Column 10, lines 55-65 in Ho cited in the

Office Action specifically describes the use of this electro-optical effect by stating "changes in the applied electric field induce changes in the refractive index of the microcavity resonator 12." Ho also specifically describes using the semiconductor structure shown in FIG. 1B as an electro-optical modulator, a switch, a tunable optical filter, a wavelength division multiplexor and/or demultiplexor as well as other potential applications in Column 2, lines 43-47 and Column 9, lines 34-37, respectively.

It is well known that in such an electro-optical effect, the GaAs, either in a bulk crystal or in a quantum well structure, does not absorb the energy from the applied electric field in form of a resonance between the energy structure of GaAs and the applied electric field. The only resonance in GaAs in a quantum well structure is the optical resonance between two quantum energy levels of the quantum well formed by GaAs and cladding AlGaAs.

Therefore, the Office Action errs by asserting that Ho's use of the electro-optical effect in GaAs teaches the recited feature of "a dielectric material that has an energy level structure that absorbs light at a selected optical frequency and absorbs electrical energy at an electrical frequency." For this reason alone, Claim 1 is distinctly different from Ho and is thus not obvious from Ho's teaching.

In addition, Ho's disclosure of GaAs also fails to suggest the recited dielectric material with the recited energy structure in Claim 1 where "the absorption of said electrical energy changes absorption of said light." Furthermore, Ho fails to suggest coupling of "an electrical signal at said electrical frequency into said optical resonator to at least partially overlap with said whispering gallery mode to modulate optical energy in said optical resonator by modulating said absorption" in Claim 1. This lack of teaching in Ho for additional features in Claim 1 further supports that Claim 1 is not obvious over Ho. Accordingly, dependent Claims 17-23, 28-32, and 34-37, based on Claim 1, are also not obvious over Ho for at least the above reasons set forth for Claim 1 and on their own merits.

Similarly, Claim 38 is not obvious over Ho based on the distinctions and reasons set forth for Claim 1. In addition and on a separate ground, in its reasoning for rejecting Claim 38, the Office Action fails to provide any evidence to support its allegation that "it would have been obvious to one of ordinary skill in the art at the time of invention that antenna that receives an electromagnetic wave is no different than a conductor that receives an electric current." In this regard, Applicants note that Claim 38 recites a very specific wireless communication system where the transceiver is a hybrid electrical and optical device with an antenna and the fact that

the use of an antenna is well known in wireless communication systems does not, per se, makes the claimed hybrid design obvious. Applicants respectfully request the Patent Office to provide specific reference for this assertion because this showing is required under 35 USC 103(a).

Turning to Claim 42 which stands rejected over a combination of Ho and Vahala, the distinctions and reasons made for Claim 1 are applicable due to the similar claimed features for the recited optical resonator and electrical coupler. Vahala is cited to show coupling of light that carries information. A review of Vahala shows that Vahala fails to fill the voids left by Ho on the claimed features discussed with respect to Claim 1. Therefore, the combination of Ho and Vahala fails to support the rejection under 35 USC 103(a).

Claims 25-27 are rejected over a combination of Ho and Boord. Boord is cited to show the use of angle-polished waveguide. But Boord, like all other prior art on record, fails to fill the voids left by Ho on the claimed features in Claim 1 that are discussed above. Therefore, the combination of Ho and Boord fails to support the rejection under 35 USC 103(a).

Claims 8, 9, 11, and 14 are rejected over a combination of Ho and Heo. Heo is cited to show optical fibers are doped with Yb, Nd, Ho, Er, Tm, Cr and Mn to provide optical gain. However, Heo's fiber amplifiers use such dopants as optical gain

media and teach only optical pumping of such dopants (see, e.g., FIG. 2 in Ho). Therefore, Heo fails to fill the voids left by Ho on the claimed features of Claim 1 that are discussed above. Therefore, the combination of Ho and Hoe fails to support the rejection under 35 USC 103(a).

Claims 15 and 16 are rejected over a combination of Ho and Hahn. Hahn is cited to show the use of Cr-doped Al_2O_3 crystal. But Hahn teaches Cr doping as an optical gain medium to amplify light. Thus, Hahn fails to fill the voids left by Ho on the claimed features in Claim 1 that are discussed above. Therefore, the combination of Ho and Hahn fails to support the rejection under 35 USC 103(a).

Claims 10, 12, and 13 are rejected over a combination of Ho and Marker. Marker is cited to show the use of iron ions in resonators at column 9, lines 64-67. The specific cited section in Marker by the Office Action appears to be incorrect because Column 9 in Marker only has lines up to line 41. Upon review of Marker in its entirety, Marker indeed describes use of iron ions in doped glass ceramics as a cladding material for solid laser energy storage media. But Marker only describes material compositions as optical gain or attenuating media and fails to fill the voids left by Ho on the claimed features in Claim 1 that are discussed above. Therefore, the combination of Ho and Marker fails to support the rejection under 35 USC 103(a).

Finally, Claim 24 is rejected over a combination of Ho and Yao. Yao is cited to show the use of a prism shaped coupler but completely fails to fill the voids left by Ho on the claimed features in Claim 1 that are discussed above. Therefore, the combination of Ho and Yao fails to support the rejection under 35 USC 103(a).

In view of the above, all rejections are not supported by the cited prior art. Under 35 USC 103(a), the claims rejected based on the cited prior art are distinctly different from and thus are patentable over the cited prior art. Accordingly, all rejections must be withdrawn.

4. New Claims 47-54

New Claims 47-54 are patentable at least because the independent Claim 47 includes claimed features in the allowed Claim 2.

In summary, Claims 1-54 are patentable and an official notice of allowance is respectfully requested.

Please apply a fee of $115 for additional Claims 47-54, and any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: August 6, 2004

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